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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/701,534	11/30/2000	Shunichi Seki	107291	5481
25944	7590	09/16/2004	EXAMINER	
OLIFF & BERRIDGE, PLC P.O. BOX 19928 ALEXANDRIA, VA 22320			CLEVELAND, MICHAEL B	
			ART UNIT	PAPER NUMBER
			1762	

DATE MAILED: 09/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/701,534

Applicant(s)

SEKI ET AL.

Examiner

Michael Cleveland

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 July 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4, 6-11, 13 and 24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-11, 13 and 24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 072904.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 7/23/2004 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-4, 8, and 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yudasaka et al. (U.S. Patent 5,989,945, hereafter '945) in view of Hirai et al. (U.S. Patent 4,683,146, hereafter '146) and Kotaro et al. (JP 06-191821, hereafter '821).

Claims 1, 8, and 14: '945 teaches a method for forming a silicon film for a device such as a thin film transistor (Abstract) comprising:

applying a coating solution (i.e., an ink composition) containing a silicon compound onto a substrate (col. 14, line 60-col. 16, line 16; Abstract) and evaporating the solvent to form a

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uniform film (col. 14, lines 4-12). Solutions may be deposited by ink-jet printing (col. 20, lines 35-40).

'945 does not teach that the silicon compound has a formula of Si_nX_{2n} . However, '146 teaches cyclic silanes (abstract) that are used as silicon precursors (col. 1, lines 5-11) that are liquids at room temperature, such as Si_5H_{10} (col. 3, lines 15-18; col. 4, lines 53-56). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have substituted Si_5H_{10} as the silane precursors of '945 with the expectation of similar results and with a reasonable expectation of success because '146 demonstrates that it is useful as decomposable precursors to form silicon films.

'945 does not teach concentrations of the silane in the solution. Therefore, one of ordinary skill in the art would have been motivated to have looked to the related art to have determined operative concentrations. '821 teaches that the silane concentrations may be 0.1-50 % by weight. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have chosen a weight percent, such as 0.1 weight percent from within the claimed range with a reasonable expectation of success because '821 demonstrates that such concentrations are operative for depositing such silanes.

Claim 2: The solution coating may take place under an inert atmosphere (col. 16, lines 29-31).

Claim 3: The film is then pyrolyzed (col. 15, lines 10-26).

Claim 4: The silicon film may be crystallized by laser treating to form a crystalline film (col. 15, lines 6-26).

Claims 10-11: '945 teaches the use of an alcohol solvent (col. 14, lines 4-12), but not a hydrocarbon with a vapor pressure at room temperature of 0.001-50 mmHg. However, '821 teaches other solvents that are suitable for depositing solution of silanes to form silicon films, such as ethylbenzene [0008], a hydrocarbon with a vapor pressure of approximately 10 mmHg at room temperature (See CRC Handbook of Chemistry and Physics, 47th edn., Weast, R.C., ed., p. D-125.) It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used ethylbenzene instead of an alcohol as the solvent with a reasonable expectation of success and with the expectation of similar results because '821 teaches that ethylbenzene is a suitable solvent for depositing such silanes.

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5. Claims 13 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yudasaka '945 in view of Hirai '146 and Kotaro '821 as applied to claim 1, and further in view of Taniguchi et al. (U.S. Patent 5,667,572, hereafter '572).

'945 and '146 are described above, but do not explicitly teach using inks with the claimed viscosities or surface tensions. In fact, '945 is silent as to the viscosity and surface tension of the ink. Accordingly, one of ordinary skill in the art would have been motivated to have looked to the related prior art to determine operable viscosities and surface tensions for ink jet inks.

'572 teaches that ink jet inks (col. 1, lines 7-10) may usefully have viscosities of 1-10 cP and surface tensions of 25-70 dyn/cm (col. 9, lines 11-31). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used such values as the particular values of the viscosity and surface tension for the ink of '945 with a reasonable expectation of success because '572 teaches that such viscosities and surface tensions are useful in ink jet printing.

6. Claims 1-4, 8, and 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yudasaka et al. (WO97/43689, hereafter '689) in view of Hirai '146 and Kotaro '821 for substantially the same reasons given above (WO97/43689 is the international application from which '945 matured.).

Claims 13 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yudasaka '689 in view of Hirai '146, Kotaro '821, and Taniguchi '572 for the same reasons given above relating to Yudasaka '945 in view of '146, '821, and '572.

Double Patenting

7. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

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A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Note: Double patenting rejections based on the same patent with different secondary references have been grouped together under a single paragraph number.

8. Claims 6, 7, and 9 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 6 and 9 of U.S. Patent No. 6,527,847 in view of Yudasaka '689. Claim 6 of '847 requires a silicon compound of the formula $\text{Si}_n\text{X}_m\text{Y}_l$ and a solvent thereof (i.e., a liquid, and therefore an ink). Claim 6 differs from the formula of present claim 6 because the claimed values of n , m , l , and the implicit values of $n+l$, overlap but are not identical to those of the corresponding values a , b , c , and $a+c$ in the present claims. Therefore, the subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the range disclosed by the reference because overlapping ranges have been held to be a *prima facie* case of obviousness, see *In re Malagari*, 182 U.S.P.Q. 549. Claim 9 of '847 teaches overlapping concentrations. '847 states that the composition is a coating composition, but the claims do not suggest a method of applying the composition. Yudasaka '689 teaches depositing silane coating compositions by ink-jet printing and teaches drying the solvent, as discussed above. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used ink-jet printing as the particular method of applying with a reasonable expectation of success because Yudasaka '689 teaches that ink-jet printing is a successful method of depositing silane precursors.

Present claim 7 differs from the claims of '847 because it requires a combination of a Si_nX_m , wherein n may be m , and $\text{Si}_a\text{X}_b\text{Y}_c$. Patented claim 1 requires an ink of Si_nX_n in a solvent and patented claims 6-7 teach $\text{Si}_a\text{X}_b\text{Y}_c$ with overlapping values of a , b , and c (see discussion of claim 15 above). Patented claim 7 teaches that combinations of the silicon compounds are

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usable together. It has long been held that "It is *prima facie* obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose.... [T]he idea of combining them flows logically from their having been individually taught in the prior art." In re *Kerkhoven*, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have combined the compositions of patented claims 1 and 6 because combination of equivalents has long been held to be *prima facie* obvious and because the claims of '847 suggest combining its compositions.

9. Claims 1, 3, and 8 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 and 15 of U.S. Patent No. 6,503,570.

Claim 1: Claim 15 of '570 teaches a method of forming a silicon film comprising ink-jet printing a compound of the formula Si_6H_{12} . Claim 15 is otherwise broader than present claim 1 except that it does not claim ink-jet surface tensions.

Claims 3 and 8 recite the composition and overlapping features of claims 1 and 6-8. The claimed temperatures would inherently dry the ink.

Claims 2-4 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 and 15 of U.S. Patent No. 6,503,570, as applied to claim 1 above, and further in view of Yudasaka '689. The claims of '570 do not specify an atmosphere. Yudasaka '689 teaches forming silicon coatings by depositing silane coating compositions by ink-jet printing in an inert atmosphere. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used an inert atmosphere as the particular atmosphere of the claims of '570 with a reasonable expectation of success because Yudasaka '689 teaches that inert atmospheres are appropriate for the operation. The teachings of Yudasaka '689 regarding crystallizing silicon are relevant to claim 4 for the reasons discussed above.

Claims 10-11 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 and 15 of U.S. Patent No. 6,503,570, as applied to claim 1 and 14, and further in view of Kotaro '821 for its teachings regarding solvent characteristics already discussed above.

Claims 13 and 24 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 and 15 of U.S. Patent No. 6,503,570, as applied to claim 1 above, and further in view of Taniguchi '572.

Taniguchi '572 renders surface tensions of ink-jet inks of 25-70 dyn/cm obvious for the reasons already discussed. '572 also renders the viscosities of claims 13 and 22 obvious.

Response to Arguments

10. Applicant's arguments filed 2/10/2004 have been fully considered but they are not persuasive.

Applicant's arguments regarding the formula of the silane precursor are unconvincing in view of Hirai, already of record, and previously applied in prosecution. Applicant's arguments regarding concentration are unconvincing in view of the teachings of Kotaro '821.

Applicant argues that there is no motivation to combine Taniguchi with the other references. The argument is incorrect because the selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07. Taniguchi is cited merely for its teachings regarding suitable surface tensions and viscosities for ink-jet inks.

Applicant argues that there is no motivation to combine Kotaro with the other references. The argument is incorrect because the selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07. Kotaro is cited merely for its teachings regarding suitable decomposable silanes and suitable solvents and weight percents for solutions of such silanes.

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Applicant argues that Matsuki '847, claim 1 claims the formula Si_nX_n and therefore does not teach the formula $\text{Si}_a\text{X}_b\text{Y}_c$. The argument is unconvincing because the latter formula is taught by Matsuki '847, claim 6.

Applicant argues that there is no motivation to combine Yudasaka with the double patenting references. The argument is incorrect because the selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07. Yudasaka is cited merely for its teachings regarding suitable method of using decomposable silanes.

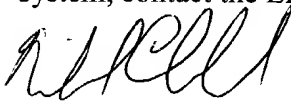
The obviousness-type double patenting rejections of claims 1-4, 8, 10-14, 17, and 19-22 based on U.S. Patent No. 6,527,847 are withdrawn in view of the amendment to the claim 1, which are no longer satisfied by a compound of the formula Si_nX_n .

Applicant argues that the current claims are broader than the claims of '570. The argument is unconvincing because selecting the claimed compound of '570 would necessarily meet the formula of Applicant's claim, and would therefore meet every limitation of the claims.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Cleveland whose telephone number is (571) 272-1418. The examiner can normally be reached on Tuesday-Friday and alternate Mon, 8-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (571) 272-1415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Michael Cleveland
Patent Examiner

~~April 19~~, 2004

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